

REMARKS/ARGUMENTS

Applicant responds herein to the Office Action dated July 8, 2005.

As requested, Figure 12 has been amended to contain the appropriate legend.

Substantively, claims 1-10 stand rejected on grounds of obviousness over Ono, et. al. (US2002/0074020), in view of Tsuchiya, et. al. (6,810,888). Reconsideration is requested.

As amended, claim 1 is directed to a substrate processing apparatus which, among other limitations, includes an atmosphere blocking member and “an outer gas discharge port formed on the atmosphere blocking member”. The atmosphere blocking member is “arranged oppositely and proximate to at least one surface of said substrate held by said substrate holding/rotating element and formed with a processing solution discharge port and a gas discharge port discharging a processing solution and gas to the central portion of said surface of said substrate, respectively”. In addition, the outer gas discharge port “is formed on said atmosphere blocking member outside said gas discharge port...” and is furthermore, so formed on said atmosphere blocking member that “an arrival position of said gas discharged from said outer gas discharge port is closer to the center of said surface of said substrate held by said substrate holding/rotating element than an intermediate portion between the center and the outer peripheral edge of said surface”.

In newly presented independent claim 19, there is recited: “an outer gas discharge port discharging gas to said surface of said substrate held by said substrate holding/rotating element is formed on said atmosphere blocking member to be interposed between an outer peripheral surface of said inner shaft and inner peripheral surface of said support cylinder in plan view.”

As defined in independent claims 1 and 19, the present invention is quite effective in expelling droplets remaining on a substrate as described in the Summary of the Invention section of the present application. The instant inventors have discovered that discharging gas only toward the vicinity of the central portion of the substrate is insufficient for removing droplets from the periphery of the substrate. This is particularly so when the substrate has a large diameter of 300mm or so, where it is difficult to remove droplets from the periphery of the substrate unless gas is discharged at a considerably large flow rate to the vicinity of the central portion of the substrate. However, doing so is disadvantageous, because discharging gas at an

excessively large flow rate causes droplets to be scattered and to adhere to the lower surface of the atmosphere blocking member, as described at page 8, lines 16 to page 9, line 7 of the instant specification.

According to the apparatus defined in the instant claims, droplets remaining in the vicinity of the central portion of the substrate are first expelled to in an intermediate portion between the central and peripheral edge of the substrate by discharging gas from a gas discharge port to the central portion of the substrate. These droplets are then expelled and removed from the peripheral portion of the substrate by further discharging gas from the outer gas discharge port. In other words, the apparatus according to the present invention includes an outer gas discharge port discharging gas to a portion closer to the center of the substrate than to the intermediate portion between the center and the peripheral edge of the substrate, in order to help and assist the gas being discharged from the gas discharge port.

In contrast, Ono discloses a technique for providing spin drying to a wafer W that is rotated at a high speed, while supplying N₂ gas for preventing oxidations from taking place at the face of the wafer W as described in the Abstract of this reference. However, in the Ono apparatus, the N₂ gas is supplied to the entire face of the wafer W, and in such manner that the amount of N₂ gas at the outer peripheral portion of the wafer W is larger than at the center thereof (see Figures 1 to 4, and paragraph [0053]). Supplying gas to the peripheral portion of the wafer in a larger amount than at the center thereof, causes droplets remaining on the face of the wafer to aggregate at the center of the wafer, rather than being removed from the peripheral portion thereof. This is, of course, in direct contrast to the teachings of the present invention, and to the specific language of the claims herein.

Thus, according to the instant claims, droplets can be removed from the peripheral portion of the substrate by discharging gas from the gas discharge port to the center portion of the substrate -- rather than to the entire surface of the wafer -- as well as discharging gas from the outer gas discharge port to a position closer to the center of the substrate than the intermediate portion between the center and the peripheral edge of the substrate. Reverting back once again to Ono, it will be appreciated that this reference fails to teach removing droplets from the peripheral portion of a substrate by providing an outer gas discharge port discharging gas to a position

closer to the center of the substrate than the intermediate portion between the center and the peripheral edge of the substrate.

Nor are the shortcomings of the primary Ono prior art, remedied by the secondary Tsuchiya reference. This reference teaches providing treatment liquid pouring means 76 which serves to pour a chemical liquid or a cleaning liquid onto a wafer W being rotated. It further teaches that the treatment liquid pouring means 76 includes three pouring pipes 76a, 76b and 76c, for respective chemical channels. However, Tsuchiya fails to teach removing droplets from the peripheral portion of the substrate by providing a gas discharge port discharging gas to the central portion of the substrate and an outer gas discharge port discharging gas to a position closer to the center of the substrate than the intermediate portion between the center and the outer peripheral edge of the substrate.

In conclusion, therefore, neither Ono or Tsuchiya disclose the idea of providing an outer gas discharge port in order to assist the gas discharged from a gas discharge port. As such, it is respectfully submitted that the inventions recited in independent claims 1 and 19 of the present application are not rendered obvious by the cited references, regardless of whether their teachings are considered alone or in combination. The remaining claims in the application include all of the limitations and features discussed above and impose further limitations which places them even further apart from the prior art. As such, it is submitted that all of the claims are directed to patentable subject matter.

Accordingly, the Examiner is respectfully requested to reconsider the application, allow the claims as amended and pass this case to issue.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 11, 2005

Max Moskowitz

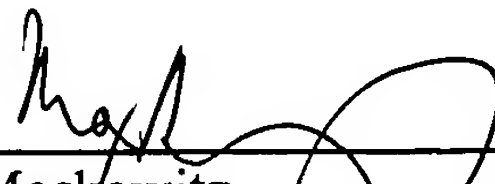
Name of applicant, assignee or
Registered Representative

Signature

October 11, 2005

Date of Signature

Respectfully submitted,



Max Moskowitz

Registration No.: 30,576

OSTROLENK, FABER, GERB & SOFFEN, LLP

1180 Avenue of the Americas

New York, New York 10036-8403

Telephone: (212) 382-0700

AMENDMENT TO THE DRAWING

Fig. 12 has been amended. The attached sheet of formal drawing replaces the original sheet including Fig. 12.